

PATENT SPECIFICATION

(11)

1 305 702

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DRAWINGS ATTACHED

(21) Application Nos. 9195/69 (22) Filed 20 Feb. 1969
 22181/69 1 May 1969

(23) Complete Specification filed 16 Feb. 1970

(44) Complete Specification published 7 Feb. 1973

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(54) IMPROVEMENTS IN OR RELATING TO STERILISING APPARATUS

(71) We, MATHER & PLATT LIMITED, a British Company of Park Works, Grimshaw Lane, Manchester 10, Lancashire, do hereby declare the invention for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to sterilising apparatus in which substances to be sterilised or cooked are contained in cans or other convenient containers, and in which sticks of cans (i.e. rows of cans with the cans of each row in end-to-end disposition) are passed in continuous fashion in turn for processing through a first water leg, a steam leg, a second water leg, and a spray cooling leg. The sticks of cans are supported by carriers mounted between two endless driven chains and are presented to loading and unloading stations to receive and discharge sticks of cans.

With some substances, for example, milk or a mixture of milk and rice, it is desirable to rotate the carriers on their passage through the apparatus to agitate the contents of the cans. Various means for effecting such rotation and agitation have been proposed and an aspect of the present in-

vention is to provide sticks of cans which can enter or leave the beam accommodation and a position in which can sticks can be loaded or discharged into or out of the beam accommodation.

Different sizes of cans may be loaded into the apparatus provided that each stick contains only one can size.

According to another aspect of the present invention there is provided in or for a sterilising apparatus, a conveying mechanism comprising a series of carriers in accordance with said one aspect of the invention supported between a pair of endless conveying chains, releasable locking means between each carrier shell and its interior beam, and releasing and indexing means for acting on said locking means at predetermined locations in the apparatus to permit relative rotation between each carrier shell and its beam to effect unloading, loading and closure of the carrier.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a diagrammatic view of a sterilising apparatus in accordance with the present invention;

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PATENTS ACT 1949

SPECIFICATION NO 1305702

In accordance with the Decision of the Superintending Examiner, acting for the Comptroller-General, dated 1 April 1975 this Specification has been amended under Section 14 in the following manner:—

Page 1, line 49. page 4, line 67, *after accommodation insert*, and there being releasable locking means between each carrier shell and beam

Page 4, line 90, *after spindle insert*, the pawl lever and circular series of pegs constituting the releasable locking means between the carrier shell and beam

Page 5, line 43. *after beam insert* for releasably locking same together

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(54) IMPROVEMENTS IN OR RELATING TO STERILISING APPARATUS

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This invention relates to sterilising apparatus in which substances to be sterilised or cooked are contained in cans or other convenient containers, and in which sticks of cans (i.e. rows of cans with the cans of each row in end-to-end disposition) are passed 15 in continuous fashion in turn for processing through a first water leg, a steam leg, a second water leg, and a spray cooling leg. The sticks of cans are supported by carriers mounted between two endless driven chains 20 and are presented to loading and unloading stations to receive and discharge sticks of cans.

With some substances, for example, milk or a mixture of milk and rice, it is desirable 25 to rotate the carriers on their passage through the apparatus to agitate the contents of the cans. Various means for effecting such rotation and agitation have been proposed and an aspect of the present invention is concerned with such means.

It is an object of the present invention to provide a carrier which safely holds sticks of cans during processing but which is easy 30 to load and unload.

According to one aspect of the present invention there is provided in or for a sterilising apparatus a carrier for supporting and conveying sticks of cans through the sterilising apparatus, the carrier comprising a beam adapted to accommodate a plurality of annularly-spaced can sticks, and a shell surrounding the beam save for an axial slot which serves as inlet and outlet for the can sticks, the beam and shell being relatively 40 45 rotatable between a position in which the

can sticks cannot enter or leave the beam accommodation and a position in which can sticks can be loaded or discharged into or out of the beam accommodation.

Different sizes of cans may be loaded into 50 the apparatus provided that each stick contains only one can size.

According to another aspect of the present invention there is provided in or for a sterilising apparatus, a conveying mechanism comprising a series of carriers in accordance with said one aspect of the invention supported between a pair of endless conveying chains, releasable locking means between each carrier shell and its interior beam, and releasing and indexing means for acting on said locking means at predetermined locations in the apparatus to permit relative rotation between each carrier shell and its beam to effect unloading, loading 60 and closure of the carrier.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a diagrammatic view of a sterilising apparatus in accordance with the present invention;

Fig. 2 is an enlarged end view of the loading and unloading stations of the apparatus;

Fig. 3 is a diagrammatic view of a carrier in accordance with the invention;

Fig. 4 is a section on the line IV-IV of Fig. 3;

Fig. 5 is a detail view of one end of the carrier;

Fig. 6 is a front view of a toothed wheel shown in Fig. 5;

Fig. 7 is a detail view of the other end of Fig. 5;

Fig. 8 is fragmentary perspective view of the carrier orientating means;

Figs. 9 and 10 are respectively diagrammatic views of a carrier correctly-orientated

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and a carrier being correctly-orientated; and,

Fig. 11 is a fragmentary perspective view of the carrier releasing and indexing means. The continuous sterilising apparatus comprises, in sequence and closed circuit within a housing 20, can stick loading and discharging stations 21, a first water leg 22, a steam leg 23, a second water leg 24, a vertical spray cooling leg 25, and a horizontal conveying leg 26 between the spray cooling leg 25 and the stations 21.

An endless conveying mechanism 27 passes through the above described circuit. This conveying mechanism 27 comprises a pair of endless chains 28 supporting between them carriers 29 for sticks of cans. At the loading and discharging stations 21 there are conveyors 30 and 31 respectively for delivering can sticks into the carriers 29 and receiving can sticks out of the carriers 29. These conveyors 30, 31 may be of any convenient construction, and there are preferably four loading stations and four discharging stations. The number of loading and discharging stations can be varied, the number being dependent on the number of can sticks supported in each carrier 29, but there are preferably never less than two loading and two discharging stations.

Each carrier 29 in accordance with the present invention comprises a substantially X-shaped beam 33 surrounded by a shell or casing 34 save for an axial slot 35 which serves both as inlet and outlet. The X-beam 33 provides four angularly-spaced can sticks accommodating spaces or pockets 36 and the shell slot 35 has an angular dimension suitable for passage radially of a stick of cans.

The X-beam 33 is, for example, formed of four X or Y shaped extrusions 37 welded to each other as indicated at 38 and the welded extrusion assembly is welded to end square or rectangular bars 39 fast on end shafts 40. The ends of the beam 33 are closed by plates 41 welded in position and through which the shafts 40 freely extend. Each pocket 36 is asymmetrical as can clearly be seen in Fig. 4 with one side of a smaller radius than the other. Thus, in viewing Fig. 4, it will clearly be seen that the pocket 36 at the right hand side of the Figure facilitates rolling out of a stick of cans 55 pocket at the left hand side of the Figure on to a discharging conveyor 31, while the provides a more positive reception location for a stick of cans being introduced into the pockets from a loading conveyor 30. The carriers 29 are presented to the loading and discharging stations so as to benefit from this asymmetric shape of the pockets or spaces 36.

The shell 34 is perforated as generally indicated at 42 for passage of steam and

water and while it is substantially circular in cross-section it is cut chordally to provide the slot 35. The shell 34 and beam 33 are relatively rotatable as hereinafter described and the shell 34 can be disposed relative to the limbs of the X-beam 33 such that passage of a stick of cans is prevented (see Fig. 8).

Each spindle 40 engages in a bearing 43 rigid with its adjacent chain 28.

Each carrier 29 has keyed to the spindle 40 at one end a plate 44 formed on its periphery with a number of, say sixteen angularly-spaced teeth 45.

On one face of the toothed wheel 44, 45, namely the carrier-adjacent face, there are provided a number of, say eight equi-angularly spaced pegs 46. A pawl lever 47 is pivoted on a projection 48 on the adjacent end plate 41 and is formed with a slot 49 for engaging on any one of the pegs 46 and a tail 50 for a purpose hereinafter described. The pawl lever 47 is normally urged by a spring 51 into engagement with a peg 46. Thus, it will clearly be seen that with the pawl lever 47 engaged on a peg 46 the beam 33 and shell 34 can rotate as a unit in the bearings 43. However, with the pawl lever 47 disengaged from the pegs 46, the beam 33 and shell 34 can rotate relative to one another. It will be seen later that the shell 34 is held stationary and the beam 33 rotated relative to the shell 34. The beam 33 can rotate only stepwise forwards.

It may be desired to duplicate this toothed wheel, peg and pawl lever arrangement at the other end of the carrier but this is not considered necessary.

The other end plate 41 of each carrier 29 mounts a follower roller 52 and a fixed T-shaped projection or abutment 53 on its face adjacent its chain 28.

The above is a description of each carrier and the above described arrangements at each end plate co-act with other means in the sterilising apparatus as later described.

The apparatus includes an endless agitating chain 54 (see Fig. 1), which serves to rotate the carriers 29 and agitate the contents of the cans. The agitating chain 54 may move in the same or opposite direction as the conveying chains 28. The agitating chain 54 is engaged by the 16-toothed plates 43 of the carriers 29 to rotate the carriers 29 in the bearings 44. The agitating chain 54 extends from approximately the inlet of the first water leg 22 at the top of the machine to the bottom outlet of the spray leg 25 at the bottom of the machine. The carriers 29 crash engage onto the agitating chain 54. A tensioning arrangement 55 is provided for the agitating chain 54.

A means is provided to ensure that the carriers are disposed at the correct orienta-

tion or attitude before entering the unloading or discharging and loading zones. The correct orientation for the carriers 29, is, of course, to present them with their axial 5 slots 35 adjacent to the conveyors 30 and 31. This means is disposed above the entry to the discharging stations 21, 31 at location A (Fig. 1) and co-operates with the follower roller 52 and T-projection 53 on the carrier 10 end plate. It is to be noted that each carrier 29 is disposed at the correct attitude when it enters the unloading/loading zones 21 with its follower roller 52 trailing.

The carrier-orientating means (see Figs. 8 15 to 10) comprises a substantially U-shaped guide track 56 fixedly secured to the housing 20 or other part of the framework of the apparatus and extending from location A before the first discharging station 21, 31 to 20 a location B after the last loading station 21, 31. The track 56 has a flared inlet 57 defined by two slightly resiliently pivoted plates 58 and 58A. Below and spaced from the plate 58 is a track member 59 which is 25 thereafter continuous to location B. This plate 58 and track member 59 define a camming slot or recess 60. A track member 61 is located immediately below the other plate 58A and is also continuous to location 30 B.

A projection or abutment 62 is connected to the plate 58 above the camming slot 60.

Reference is now made particularly to Figs. 8 and 9 which show a carrier 29 entering the guide track 56 correctly orientated. In this case the follower roller 52 simply runs along the guide track 56 maintaining the carrier 29 in the correct attitude during unloading and loading.

40 In Fig. 10, there is shown a carrier 29 entering the guide track incorrectly orientated, i.e. the follower roller 52 leading instead of trailing. In this case, the abutment 53 strikes the abutment 62 causing the carrier 29 to rotate (see arrow C) so that the follower roller 52 enters the camming slot 60 and due to chain movement the carrier 29 pivots further about the follower roller 52 (see arrow D) until its attitude is such 45 that the follower roller 52 takes up the desired trailing position. Thus, the carrier 29 is correctly orientated.

The flared mouth 57 of the track 56 assists in adjusting the carrier 29 on entering the 55 track 56. For example, if the carrier enters with the follower roller 52 at say 3 o'clock, the follower roller 52 will strike the adjacent plate 58A and be urged to the desired trailing position.

60 Other guide and cam arrangements may be employed to effect carrier attitude correction but the above arrangement which is simple, positive, and effective is preferred.

A baffle 63 (Fig. 2) is connected between 65 the conveying chains 28 between adjacent

carriers 29; each baffle 63 may be carried by the same link of chain as the leading carrier of the two carriers between which it is located although this is not essential. The baffles 63 act to compensate for convection currents within the apparatus and are shaped to provide downwardly-extending runways 64 for the cans at the discharging stations although again this is not essential. The baffles 63 also act as bars to maintain the distance between the two conveying chains 28.

In use, therefore, sticks of cans supported by the carriers 29 pass through the closed circuit of water, steam and spray legs and 80 are continuously rotated by the agitating chain 54.

After disengagement from the agitating chain 54 and before entry to the discharging and loading zone 21, the carriers 29 85 have their orientation or attitude corrected, if required, as aforesaid and the correct orientation or attitude maintained.

When each carrier 29 is correctly orientated and as it approaches the first discharging station, its beam 33 and shell 34 are so relatively located that the axial slot 35 is not in register with a can-holding space or pocket 36. It is therefore necessary to effect such registration before a stick of cans can 95 be discharged. This is effected by a releasing and indexing mechanism (see Fig. 11) which acts on the pawl lever 47 and pegs 46 and the toothed wheel 44, 45 (Figs. 5 and 6). This mechanism releases the lock 100 between the beam and shell, holds the shell stationary and rotates the beam through 45° bringing a space or pocket 36 into register with the axial slot 35. At the following three discharging stations a similar mechanism is provided (the only difference is the shape of the cam of the mechanism as mentioned hereinafter) and at each of the other three discharging stations the beam is rotated through 90° to register the three other 105 pockets in turn with the axial slot. The carrier is then moved to the first (bottom) loading station still with a pocket in register with the axial slot and is loaded with a stick of cans. At the following three loading stations the beam is each time rotated through 90° to present the other pockets for loading and thereafter the beam is indexed through 45° to take the axial slot out of register with any of the pockets. This 110 indexing is effected by a mechanism as shown in Fig. 11 save that the cams are reversed (turned through 180°).

Each releasing and indexing mechanism (Fig. 11) comprises essentially a fixed position cam plate 65 (45° or 90°) and an indexing lever 66 with a roller or lateral projection 67 at one end for engaging the toothed wheel 44. The lever is pivotally mounted and is urged towards the toothed 125

wheels 44 of the carriers 29 by a fluid ram 68. This lever 66 is supported in a resiliently mounted bracket forming part of an arrangement such that if, for example, a 5 can jams the fluid ram 68 is released to disengage the indexing roller 67 from the toothed wheel and the apparatus is simultaneously stopped.

At each discharge station there is a pivotal gate 69 connected via a lever 70 and a rotatable spindle 71 with another fluid ram 72. On operation of the ram 72 the gate is pivoted to allow a stick of cans to leave a beam pocket and roll on to a conveyor 31.

10 In operation, the cam plate 65 acts on the tail 50 of the pawl lever 47 to disengage the latter from a peg 46 against the action of the spring 51 and linear movement of the carrier 29 causes the toothed wheel 44, 45 and the indexing roller 67 to engage and depending on the nature of the cam 65 (45° or 90°) the beam is rotated a distance equal to two or four teeth of the toothed wheel 44, 45, movement of the shell 34 being prevented by the follower roller 52 engaging in the guide track 56. After unloading the carrier passes the cam plate 65 and the pawl lever 47 re-engages a peg 46 of the toothed wheel 44, 45 until the next releasing 20 and indexing mechanism is reached.

Instead of cam plates 65 it may be possible to employ short endless chains, driven or not.

It is to be noted that the carriers are unloaded or discharged as they are bodily moved downwards and loaded or charged as they are bodily moved upwards. This prevents cross-contamination.

30 It is also to be noted that, due to the construction of the carrier attitude correction means, the can stick accommodation space of each carrier first discharged is also the first to be loaded. This is important if different sizes of cans are being processed 40 together.

Reference is made to our copending Patent Application No. 38161/72, 38162/72 (Serial No. 1 305 703 filed 16th August 1972 and divided out of the present Application, which copending application is particularly directed to the carrier orientating means disclosed herein.

WHAT WE CLAIM IS:-

55 1. A carrier for supporting and conveying sticks of cans through a sterilising apparatus comprising a beam adapted to accommodate a plurality of angularly-spaced can sticks, and a shell surrounding the beam 60 save for an axial slot which serves as an inlet and outlet for the can sticks, the beam and shell being relatively rotatable between a position in which the can sticks cannot enter or leave the beam accommodation and a position in which the can sticks can be loaded into or discharged out of the beam accommodation.

2. A carrier as claimed in claim 1, in which the beam is formed with four angularly-spaced can stick accommodating spaces 70 or pockets and has at each end a spindle extending freely through an end plate of the shell, which shell is perforated.

3. A carrier as claimed in claim 2, in which each space or pocket is asymmetric 75 in cross-section to provide a relatively flat run-on side and a relatively arcuate receiving side.

4. A carrier as claimed in claim 2 or 3, comprising on the exterior surface of one end plate, a follower roller for engagement in a guide track and an angularly-spaced projection or abutment for engagement with an orientating projection or abutment.

5. A carrier as claimed in claim 4, comprising on the exterior surface of the other end plate, a pivoted sprung-loaded pawl lever adapted to engage any one of a circular series of pegs on the surface of a toothed wheel fast on the adjacent spindle. 85

6. A carrier for supporting and conveying sticks of cans through a sterilising apparatus substantially as hereinbefore described with reference to the accompanying drawings. 90

7. In or for a sterilising apparatus, a conveying mechanism comprising a series of carriers supported between a pair of endless conveying chains and each comprising a beam adapted to accommodate a plurality of 100 angularly-spaced can sticks, and a shell surrounding the beam save for an axial slot which serves as an inlet and outlet for the can sticks, the beam and shell being relatively rotatable between a position in which the can sticks cannot enter or leave the beam accommodation, 105 and a position in which the can sticks can be loaded into or discharged out of the beam accommodation, releasable locking means between each carrier shell and beam, and releasing and indexing means for acting on the locking means at predetermined locations to permit relative rotation between each carrier shell and beam to allow unloading, loading and closure of the carrier. 110

8. In or for a sterilising apparatus, a conveying mechanism as claimed in claim 7, in which the locking means is a spring-loaded pivoted pawl lever on the carrier shell for engaging any one of a circular series of pegs on a toothed wheel fast with the carrier beam. 115

9. In or for a sterilising apparatus, a conveying mechanism as claimed in claim 120 8, in which the releasing and indexing means is a cam adapted to act on the pawl lever to disengage it from the pegs and an indexing lever adapted to engage the toothed wheel to rotate the carrier beam, means being pro- 125 130

vided to resist rotation of the carrier shell.

10. In or for a sterilising apparatus, a conveying mechanism as claimed in any one of claims 8 to 9, in which each carrier has 5 at an end thereof a toothed wheel, movable agitating chain or similar means means being provided and being engageable by the carrier toothed wheels for effecting rotation of the carriers relative to the conveying 10 chains.

11. In or for a sterilising apparatus, a conveying mechanism as claimed in claim 10, in which the agitating means is an endless chain movable in the same or opposite 15 sense to the conveying chains and in which the carrier toothed wheels crash engage with the endless agitating chain.

12. In or for a sterilising apparatus, a conveying mechanism as claimed in claim 20 11, in which a tensioning arrangement is associated with the agitating chain.

13. In or for a sterilising apparatus, a conveying mechanism as claimed in claim 25 7, substantially as hereinbefore described with reference to the accompanying drawings.

14. Sterilising apparatus comprising a pair of endless conveying chains, a series 30 of carriers for holding can sticks extending between the conveying chains, each carrier comprising a beam adapted to accommodate a plurality of angularly-spaced can sticks, and a shell surrounding the beam save for an axial slot which serves as an 35 inlet and outlet for the can sticks, the beam and shell being relatively rotatable between a position in which the can sticks cannot

enter or leave the beam accommodation and a position in which the can sticks can be loaded into or discharged out of the 40 beam accommodation, a releasable locking means at one end of each carrier shell and beam and including a toothed wheel, a pair of angularly-spaced orientating projections at the other end of each carrier, the con-

45veying chains moving the carriers through, in sequence, a circuit consisting of a plurality of discharging stations, a plurality of loading stations, a first water leg, a steam leg, a second water leg, a spray water leg 50 and a return leg, an endless agitating chain extending partially through the circuit for engagement by the carrier toothed wheels

55 to effect rotation of the carriers, guide and cam means at the entry to the discharging stations to co-operate with the orienting projections on each carrier and orientate the carrier, if necessary, to present the carrier slot to discharging and loading conveyors, and releasing and indexing means 60 at each discharging and loading station to release each carrier locking means to permit relative rotation between the beam and shell for discharging and loading purposes.

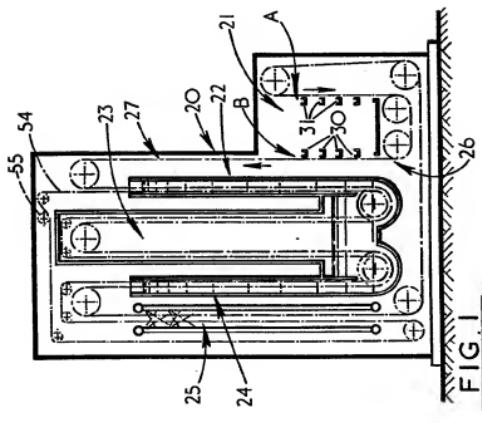
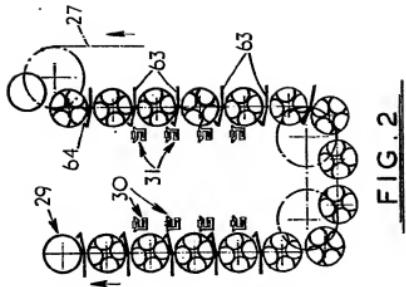
15. Sterilising apparatus substantially as 65 hereinbefore described with reference to, and as illustrated, by the accompanying drawings.

MARKS & CLERK,

Chartered Patent Agents,

Agents for the Applicants.

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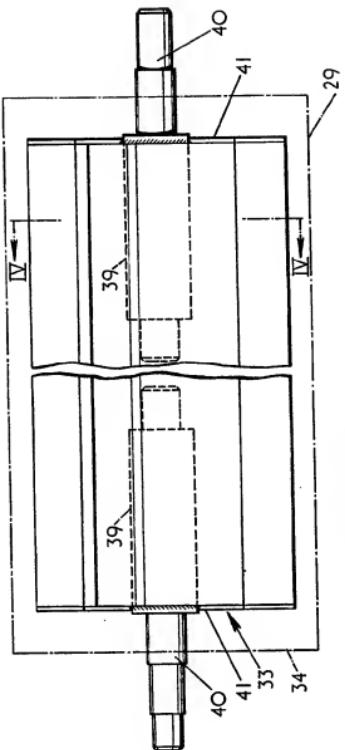


FIG. 3

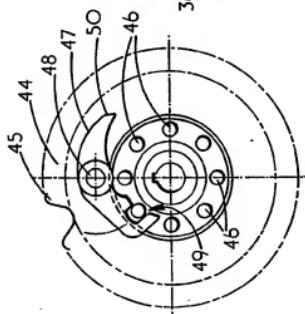
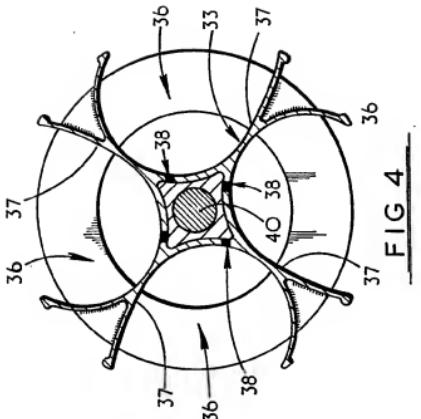
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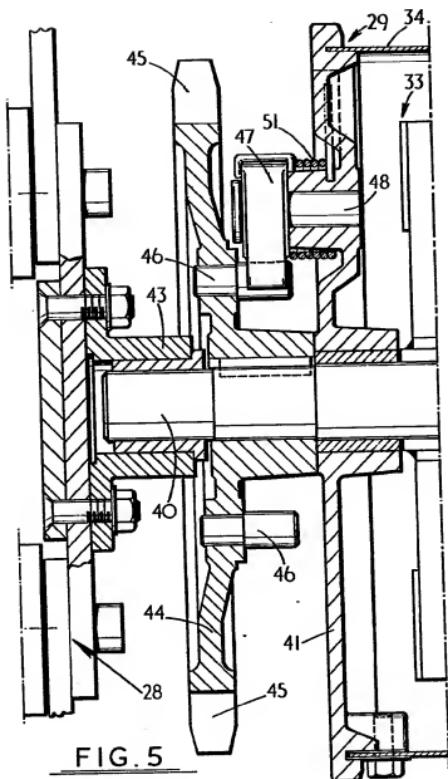
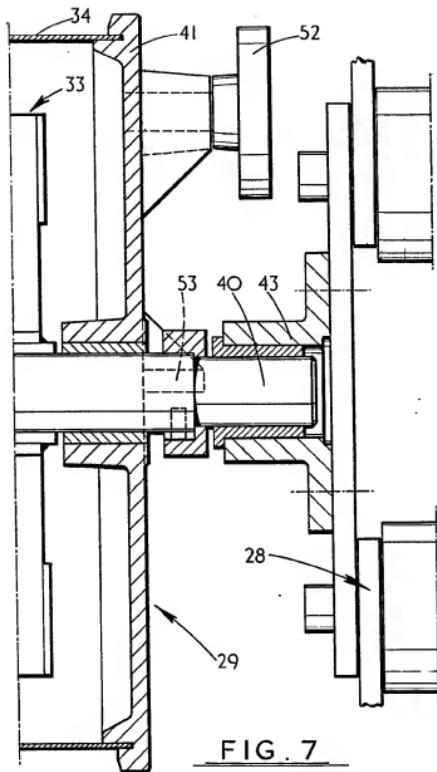


FIG. 5

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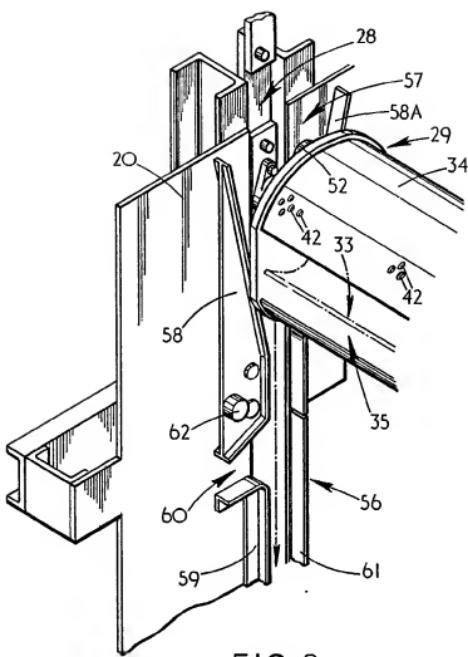


FIG. 8

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